Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

Appian Way — Built 312 B.C.

Vol. 4. June 1922. No. 6

EVERYBODY'S HAPPY

BY crushing, screening and storing rock obtained from nearby fields during the past winter, the Highways Improvement Company of South Bend, Indiana, were able to get material for their six mile contract cheaper than if they had had it shipped in, were able to keep their organization together during the winter, and were able to get rid of rocks and make money for the farmers in the district where the road is to be built.

A survey of the farms along the road was made after the contract was awarded and it was decided that enough stone could be secured from the fields to make it pay to put in a portable crushing and screening plant. The plant was set up at the middle point of the new road and stone hauled in by farmers from within a radius of four miles.

Crushing and screening reduced the stone to four sizes ranging from dust to four inches. The several sizes were stored in separate piles more than twenty feet high by means of the conveyor, so little ground space was required and the material is in shape to be reclaimed quickly when it is taken out for the road.

***Catalog 29-X** tells all about the **No. 3 Austin Portable Gyratory Crushing and Screening Plant** that has helped to make this such a profitable venture. Write for your copy now.*

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Successful Methods

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Fully Motorized Equipment

METHODS of handling work change so fast in this country that it is hard to realize that only ten years ago very few motor trucks were used on construction jobs. Some concerns had seen then the possibilities that trucks offered for speeding up their work and cutting costs. Most construction men, however, were still in a show-me attitude on the real practicability of trucks for their use. The truth of the matter is that as late as 1915 very few truck manufacturers had seen the great market which the construction field offered them.

Probably the war hastened the use of trucks for construction work. It may be that the truck would have come into its own just as quickly with the constructor anyway. Whatever the case, the motor truck is used now on every class of construction work to an extent scarcely appreciated even by the truck builders themselves.

Until recently trucks have been used chiefly for handling construction materials and for removing spoil. In the last year or so more and more heavy machinery has been permanently mounted on motor trucks. This tendency toward fully motorized equipment bids fair to bring about a great change in the plant and methods used on various kinds of field work where loads or quantities have to be handled that make hand labor costly.

It is becoming quite common to see concrete mixers of all sizes on motor-truck mountings. The possibilities in this direction appear to be large. One mixer manufacturer is reported to be about ready to offer a small mixer on the well-known flivver. In this case the truck engine will also drive the mixer. Such a combination opens up a lot of chances to cut costs.

Paving contractors in Chicago and New York have gone so far as to mount each of their concrete mixers on a truck and each set of material bins on a truck. Of course, they use trucks for hauling the materials. And now two of them are using light locomotive cranes mounted on motor trucks to handle their materials with clamshells. They thus have complete outfits which can move from one job to another and be at work again almost before equipment mounted in the ordinary way can start to move.

No prophet is needed to see that this idea of equipment that is as portable as a motor truck is going to take fast. The strange thing is that the idea has been so slow to develop. The value of motor-truck mounting of heavy units has now been shown, however, on many kinds of work. The greatly increased efficiency of the trucks that are used for hauling that is thus made possible will certainly increase the number of trucks in use. At the same time the quick portability of equipment mounted on motor trucks will permit a greater use of more efficient machinery. This quick portability feature also will permit the use of machinery to replace manual labor in many places where the use of slow-moving equipment has not been practicable.

Fall Road Contract Lettings

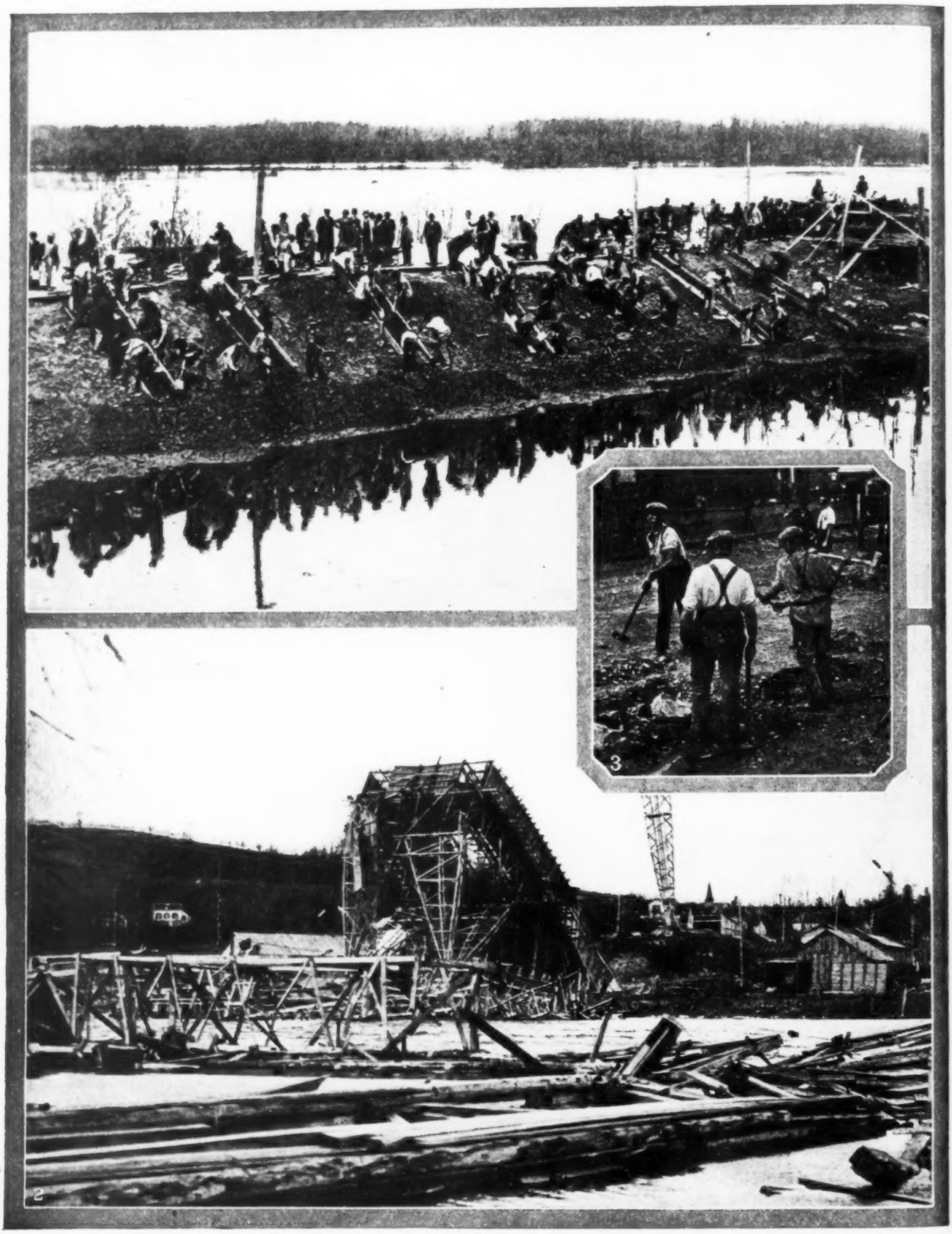
SOME way the impression is out that the attempt made last year to have road contracts let in the fall was a failure. The results secured were evidently limited. But there is no reason why the idea should be ridiculed nor considered impracticable.

Any plan which calls for a complete change in the business methods of an industry cannot be put over easily. The larger the industry and the more complicated its system of functioning, the more difficult it is to get any new plan of doing business accepted by it. Certainly road building as an industry is just about as big and as complicated these days as any line of business.

Some results were secured by the campaign last year for earlier lettings. If followed up properly this year and next, results worth while might be expected. In a few years the seasonal buying peaks of the industry could thus be reduced considerably and the low spots in the business curve raised.

Last year the campaign was put on under Secretary Hoover's leadership to reduce unemployment. But the real permanent need for earlier lettings is to cut costs. Manufacturers of construction machinery and producers of construction materials have a very seriously unbalanced load factor. This necessarily increases their costs and their prices to the consumer. This year a few equipment manufacturers gave an extra discount for orders placed in January and February. This plan gave them an early volume of orders which helped their manufacturing schedules wonderfully. But users will not buy until they have a job. If engineers continue to hold off until spring before letting work, their clients simply will have to pay the higher prices forced by the great peak of orders in April, May and June and the dearth of business each winter.

Destruction

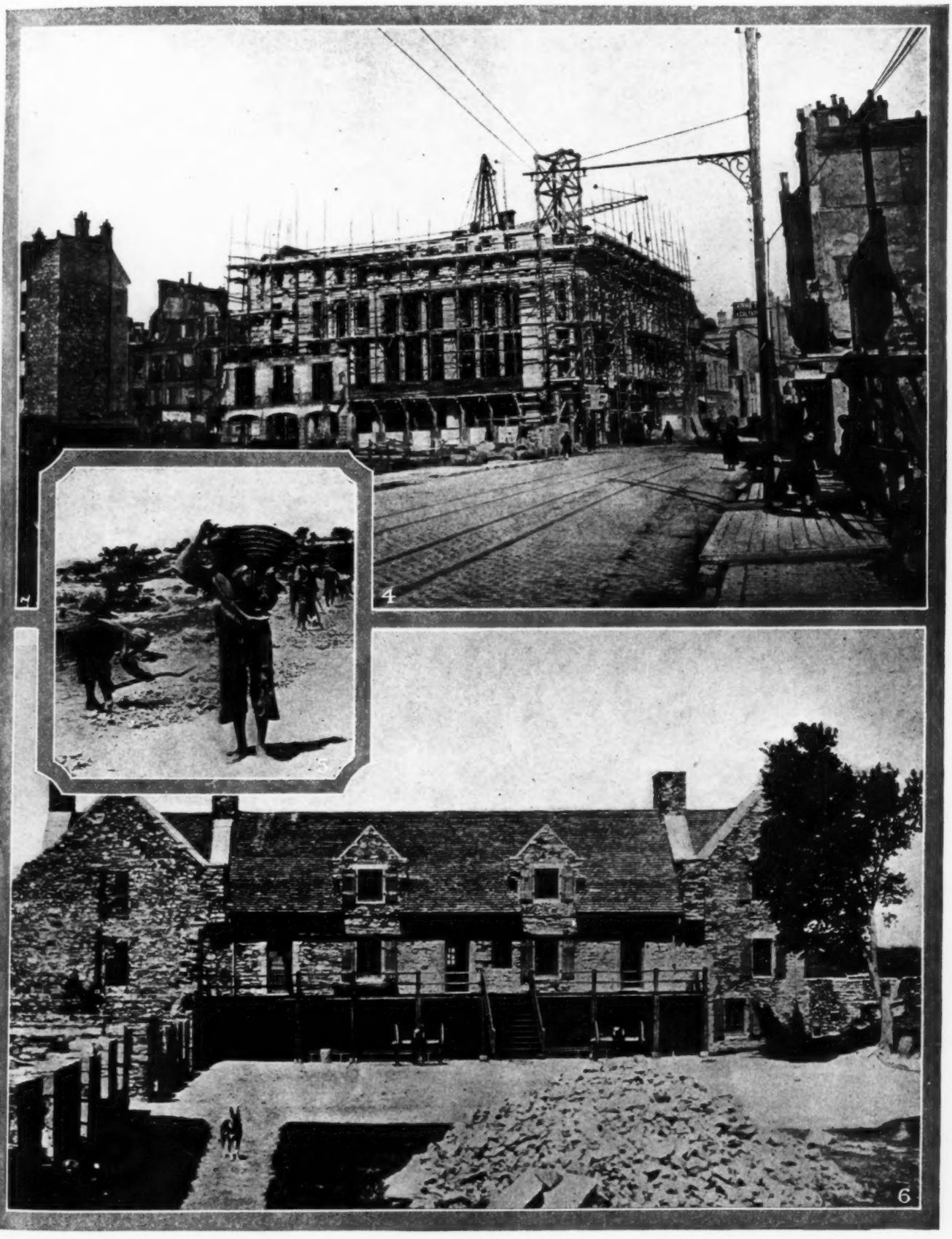


1—A rush job on a levee at Memphis. This piece of emergency work saved 18,000 bales of cotton stored in warehouses below the river level. © *P & A Photos*

2—A new bridge across the Seine at St. Pierre du Vauvray, which was destroyed by a tornado. The construction plant may be seen in the background. © *International*

3—Destroying a London pavement to make ready for a new one. © *Keystone Views*

Reconstruction



4—A bit of reconstruction in the city of Rheims. © *P & A Photos*
5—Rebuilding the road between Jerusalem and Jericho in the Holy Land. © *International*
6—Restoring a Revolutionary landmark. One of the barracks of Fort Ticonderoga. © *P & A Photos*

GETTING AWAY WITH A FLYING START

New Jersey Contractors Show How to Resume Work Quickly in the Spring

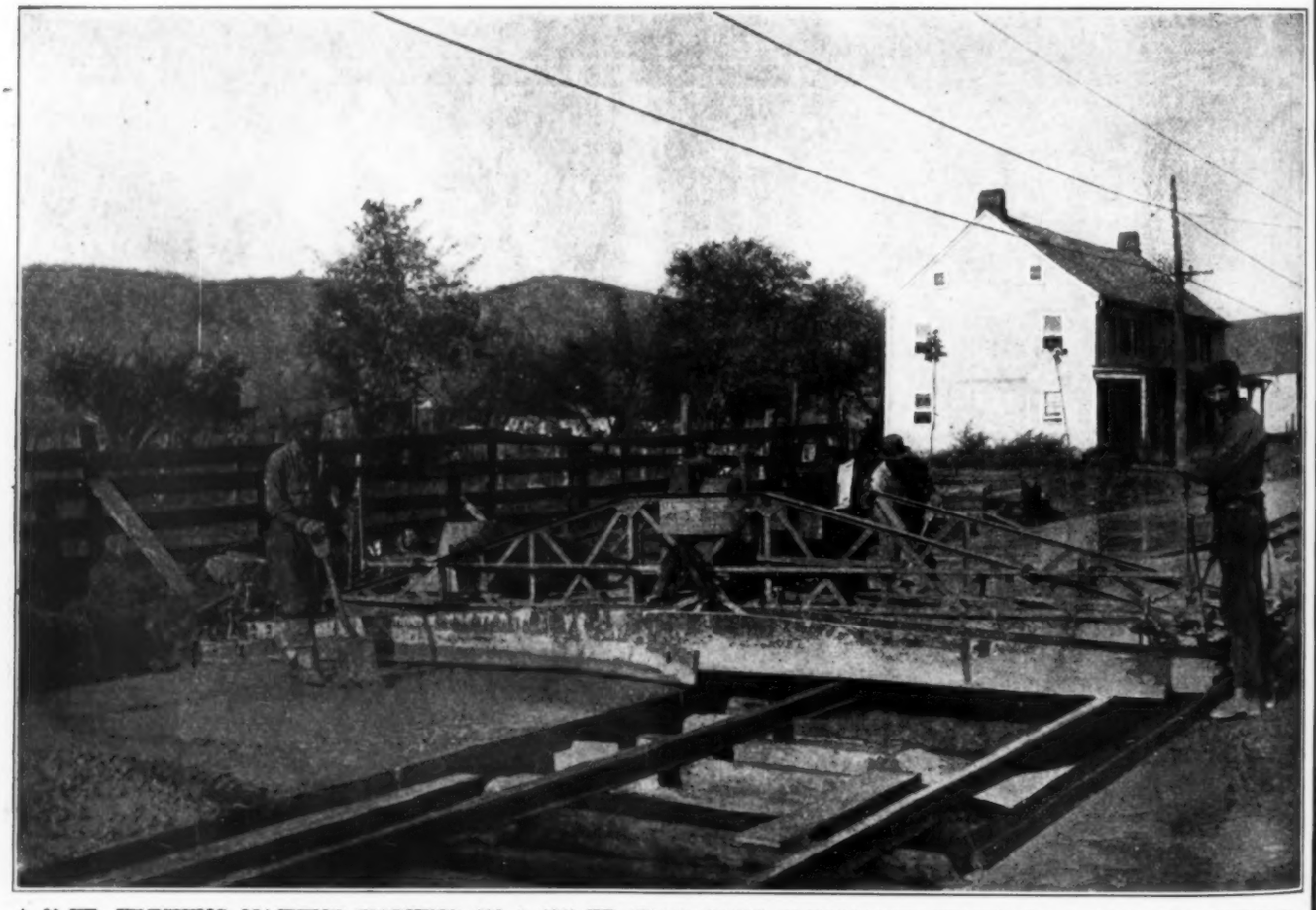
A COMBINATION winter storage and boarding camp was one of the reasons which enabled Korp & Korp, road contractors of New Jersey, to get away with a flying start on their concrete road job in Warren County this season. This job was begun last summer and was halted by the winter weather. Thereupon, the contractors made every possible preparation which would insure an early start this spring and as a result they have just completed a job which would have occupied their forces through part of summer under other starting conditions.

At a central point on their job, which consists of 4.2 miles of 20 ft. 8 in. double reinforced concrete road in Warren County, the contractors took over an old schoolhouse of considerable size as their headquarters. Here they not only maintained their office, housed and fed their crews, but maintained a repair shop and stored plant. With few exceptions their entire force lived and had their meals at this camp. Edwin Korp, Jr., as manager of the operations, himself spent a great portion of his time either on the job or in this camp. This housing of the entire force in one place had the effect of keeping the men together and working up an esprit de corps.

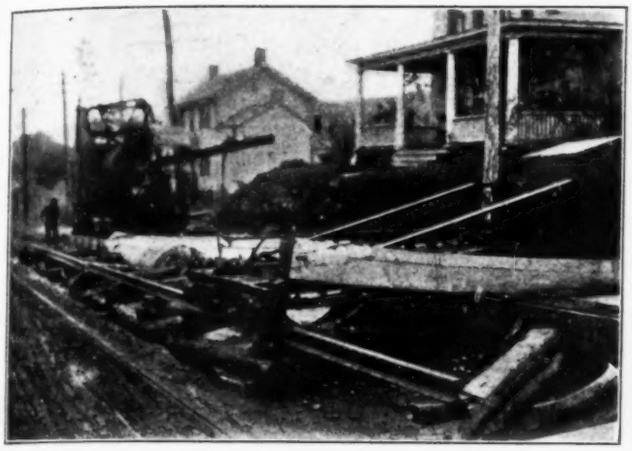
When winter weather stopped operations, all the plant used on the job was brought to this point and put in winter storage after being overhauled. Mr. Korp attributes the fact that they were able to reorganize their forces and put their machinery out in the field in a workwise condition at such an early time in spite of the bad weather to be due to this combination winter storage and boarding camp. His material trestle was intact from the previous season's work, and being able to take good care of his men and machines allowed him to get started at the first possible moment.

The job was begun August 21, 1921, and 3.7 miles completed before cold weather stopped the work. On May 2, 1922, the contractors went into action again, and in spite of bad weather the remaining 1.5 miles will have been completed when this appears in print. In addition to the 4.2 miles of 20 ft. slab, 3100 cu. yd. of stone was used to raise the grade line of the old road.

On account of a street car track paralleling the road, it was necessary to lay the slab in half sections for a distance of 4400 ft. For this distance the trolley track was taken from the side of the road and placed in the center between slabs, and 5 in. penetration macadam was laid in this space. Where the trolley



A 20-FT. FINISHING MACHINE WORKING ON A 13½-FT. SLAB—NOTE TEMPORARY TEMPLATE BOLTED TO STRIKE-OFF BOARD OF FINISHER.



ANOTHER VIEW OF FINISHER.

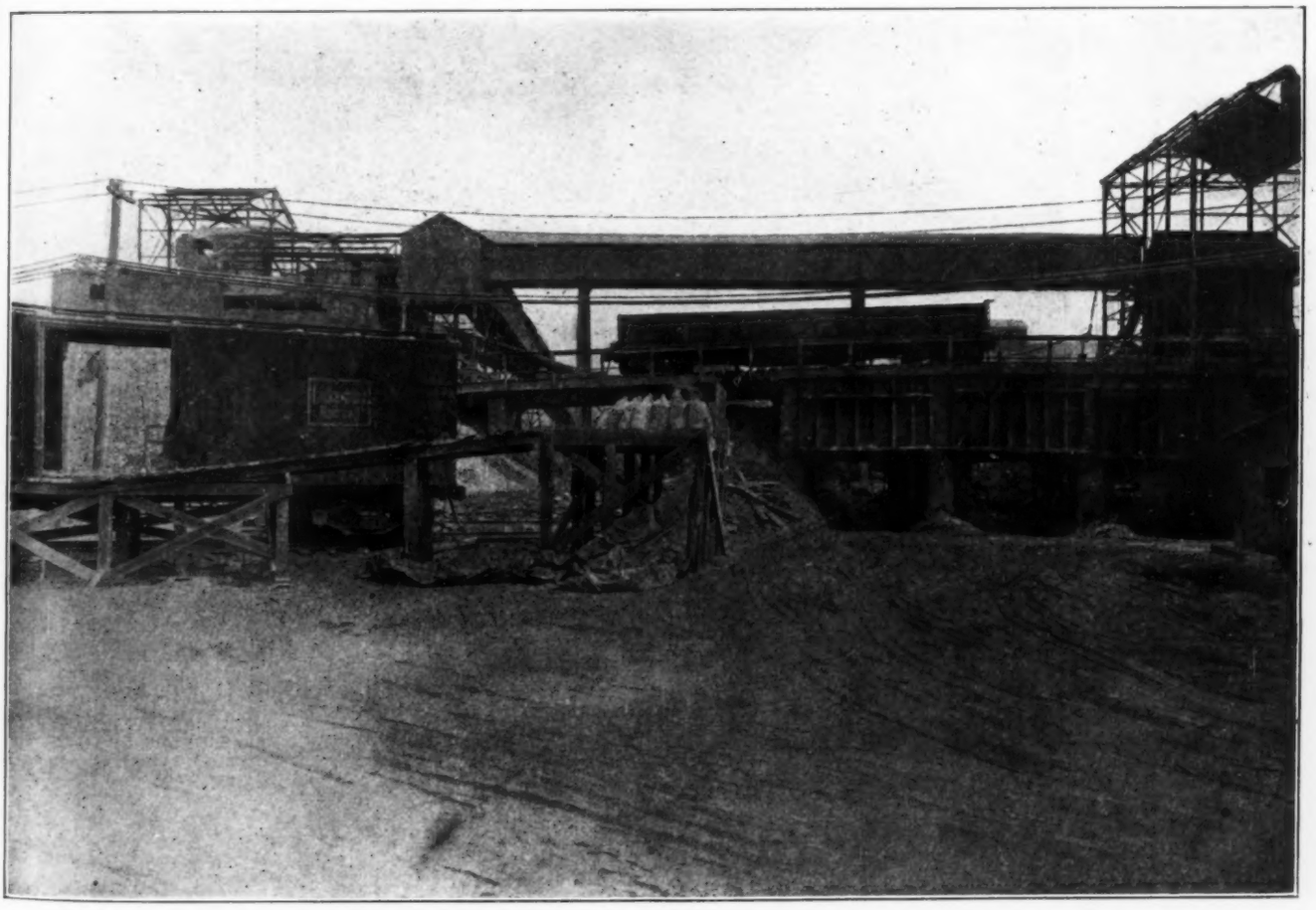
track was placed in the center and slab laid in half sections, the width varied from 11 ft. to 13 ft. 6 in.

On this stretch, as well as on the 20 ft. section, a 20 ft. mechanical fiinisher was used. One of the illustrations shows the manner in which the contractor contrived to use the 20 ft. finishing machine on a 13 ft. 6 in. slab. One set of trucks was carried on forms and the other ran on a rail, as shown in the photograph. On the return trip, or when the second half of the road is being finished, the wheels now traveling on this rail will run on the forms and the wheels now traveling on the forms will be carried on the finished concrete. To take care of the crown of the road, a strike-off board cut to the proper curve was bolted on to the strike-off board of the finisher.

Another illustration shows the plant which the contractor used to charge batch boxes which were transported on motor trucks. The trestle shown in the photograph is located at the plant of the cement com-

MAKING TESTS OF NEW HIGHWAY BY CUTTING CONCRETE CYLINDERS.

pany from which the contractor obtained the cement. The bins with tunnel gates were constructed underneath the trestle. Two bins are for stone and one



VIEW OF MATERIAL RECEIVING PLANT. TRUCKS BACK IN UNDER TRESTLE AND ALL BATCHES ARE CHARGED SIMULTANEOUSLY.

for sand. Cement is delivered at a nearby platform as shown. Trucks simply back in, receive their charge of stone, all batch boxes being charged simultaneously. The batch boxes then are loaded with sand in a similar manner and as the truck pulls out the proper amount of cement is taken on. Water is pumped by means of an old fire engine through 2 in., 1½ in., 1¼ in. pipe for a distance of 2 miles.

One of the features of the new specifications in New Jersey is the longitudinal joint, which consists of a steel plate which runs down the center of the road for the full thickness of the slab. This joint practically cuts the road in half. Expansion joints are placed at about 85 ft. centers, consisting of a premoulded asphalt strip. After the steel plate is set in place, the finishing machine works right over it. Later a bridge, which is part of the sunshade and which travels on the steel forms, allows a man to search and, by means of an edging tool, expose the steel joint. Asphalt is later poured into this joint.

The force is as follows: 1 mixer engineer; 1 finisher engineer; 1 man edging tool on center joint; 3 men spreading concrete; 1 man placing center joint and top reinforcing; 1 man placing reinforcing bottom layer; 1 man to place hoists on batch boxes; 1 man running hoist and batch transfer; 2 men dumping boxes; 1 fireman who also sprinkles subgrade; ten 5-ton trucks. When the round trip was at a maximum of 3 miles, 10 trucks were used, making the distance in an average time of 8 min.

SUBMARINE SAW TRIMS PILES

A SAW which cuts piles, irrespective of the state of the tide, has been devised by the Frederick Snare Corporation and is in use on a pier job at Philadelphia. This job includes the driving and sawing off of about 7600 piles.

As shown in the illustration, the rig consists of a 48-in. circular saw attached to the bottom of a shaft which is operated by a 35-hp. motor. A "bridge," which runs the entire width of the pier (185 ft.) is mounted on seven trucks and is propelled over rails by means of an engine driven by compressed air. The bridge carries two 14-in. I-beams which serve as rails on which the saw rig may travel sideways.

Before sawing the piles, 3 by 12 timbers, which are part of the permanent deck, are bolted to each pile at the proper elevation for cut off. The saw is then run up and placed on these timbers as a guide and the piles sawed off. By means of a screw I-bolt on the top of the saw shaft a man is enabled to keep the saw always in adjustment, so that the cut-off is made sufficiently true for the timber caps.

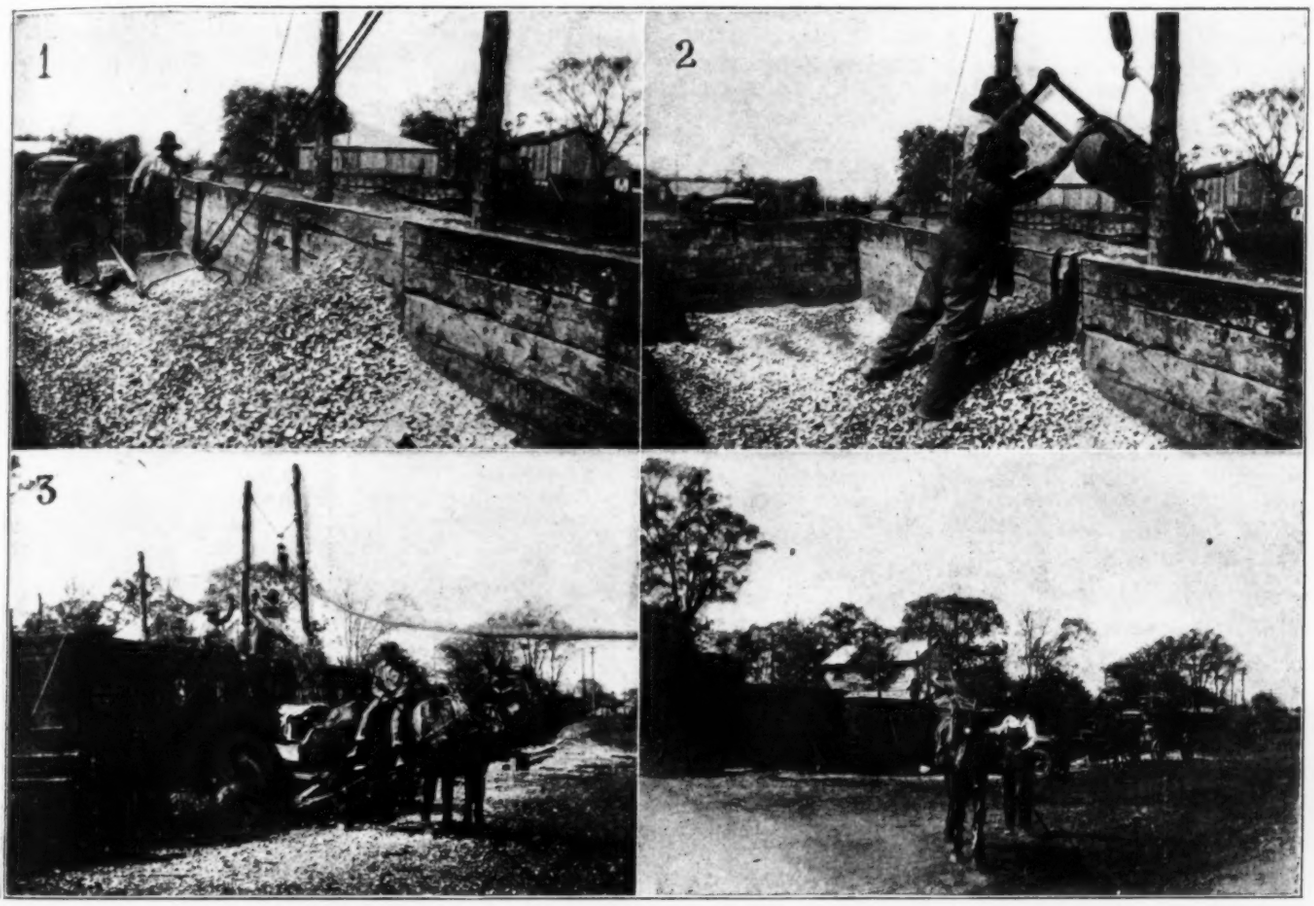
The pier is 185 ft. wide by 550 ft. long. The piles vary in length from 40 ft. to 75 ft. and are driven by two floating pile drivers. The piles are on 4 ft. centers, except at column bases, where they are spaced 2 ft. 6 in.

The saw will cut off a bent of 225 piles in three hours at low tide. The idea of the saw was to cut the piles off under water, and while this operation has been done satisfactorily, the progress made with the saw and the pile driving has been such that the cutting off of the piles is only done when the cut-off is above water. The saw is water cooled by a man with a shovel who also frees the pile heads. After they are sawed off the pile heads are sawed into lumber.

ECONOMICAL AND EFFICIENT

North Carolina Contractor Devises Method to Double Speed in Unloading

By R. E. Swinney, Construction Engineer,
North Carolina State Highway Commission.



A CHEAP and efficient method of unloading sand or gravel from low side coal cars has been developed by a colored man on a road project of P. R. Ashby, near Raleigh, N. C. This man took the contract to unload the gravel for a concrete base road and found that 4 men could unload about 1½ cars of gravel a day. He decided to devise a scheme so his horse could do most of the work instead. As seen in photograph No. 3, two poles were fastened to the side of the car with a rope between and a single block pulley fastened upon the rope. The force consists of a man driving the horse to load the scraper and two men in the car to guide the scraper. Photograph No. 1 shows loading the scraper. A small amount in the end of the car and a small amount in the center of the car have to be shoveled when there are no teams standing to be loaded. After the scraper is loaded and drawn to the center of the car, it is lifted straight up until the bale of the scraper hits the block, as in photograph No. 2. All that the two men do is to steady the scraper as it is being lifted and tilt the handles as shown in photograph No. 3, and the gravel falls in the wagon. In photograph No. 4 can be seen the horse and driver loading a truck instead of a wagon. With this method it was found that the 3 men and horse could unload 3 cars a day and sometimes more depending on the number of wagons or trucks hauling the gravel away. As these were all 50-ton cars a cheaper method would be hard to find. All of this gravel was hauled directly to the work.

THE APPIAN WAY

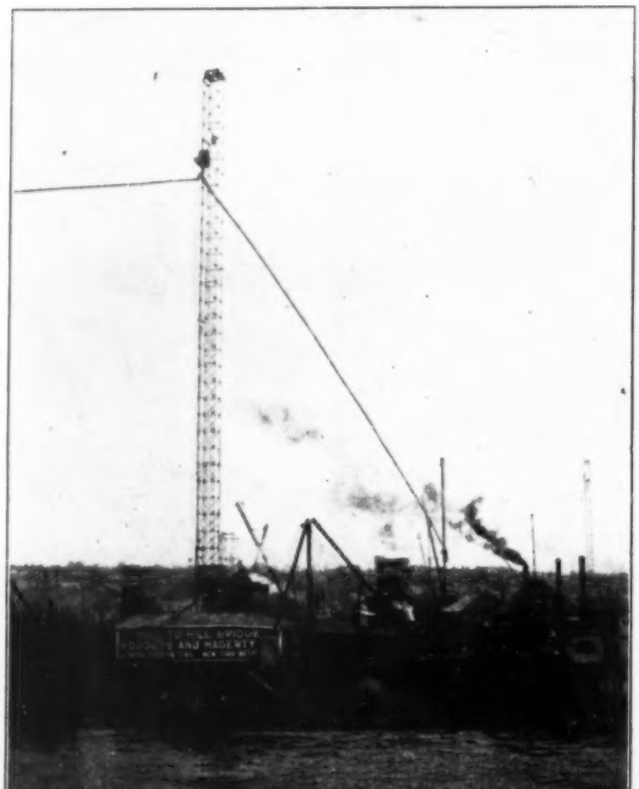
ON the front cover of Successful Methods for this month is a section of the famous Via Appia or Appian Way, which, although 2200 years old, is still as fine as any automobile roadway built in modern times.

This road, which was constructed for military purposes by the censor Appius Claudius Caecus, 312 B.C., ran from Rome south through Capua to Brundusium and was about 350 miles in length. It varied in width from 14 to 18 ft. and like other Roman roads was paved with hard stone in irregular blocks closely fitted together and resting on a firm substructure. In 1853, the road, which had been covered and sunken, was uncovered for a distance of eleven miles.

HILL TO HILL BRIDGE AT BETHLEHEM

Great Length and Irregular Layout Present Difficult Concreting Problem

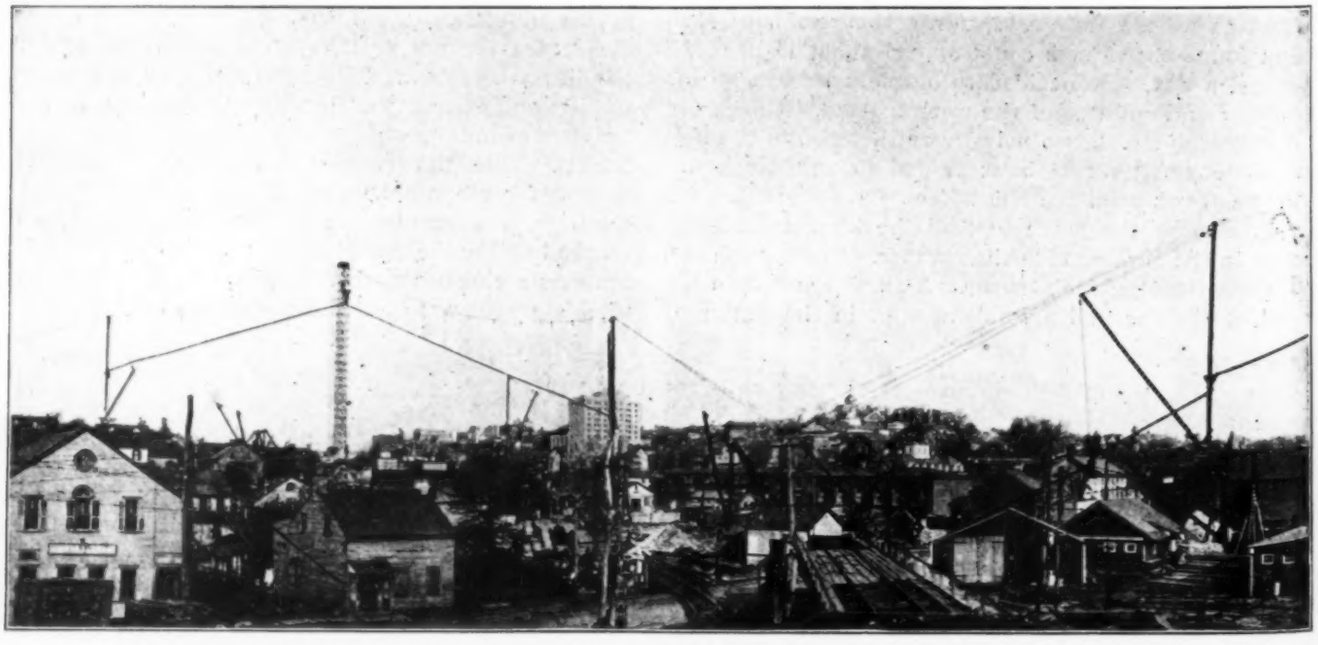
THE big Hill to Hill reinforced concrete arch viaduct spanning the Lehigh River, the Lehigh Coal and Navigation Company's canal and the tracks of five railroads, estimated to cost $2,500,000, is now fairly on its way to completion at Bethlehem, Pennsylvania. Rodgers & Hagerty, of New York City, are the general contractors. Inasmuch as the total overall length, including approaches, is about 6000 ft., and as shown in the accompanying general plan, the layout is irregular, the concreting plant which has been installed to do this job is worthy of note.



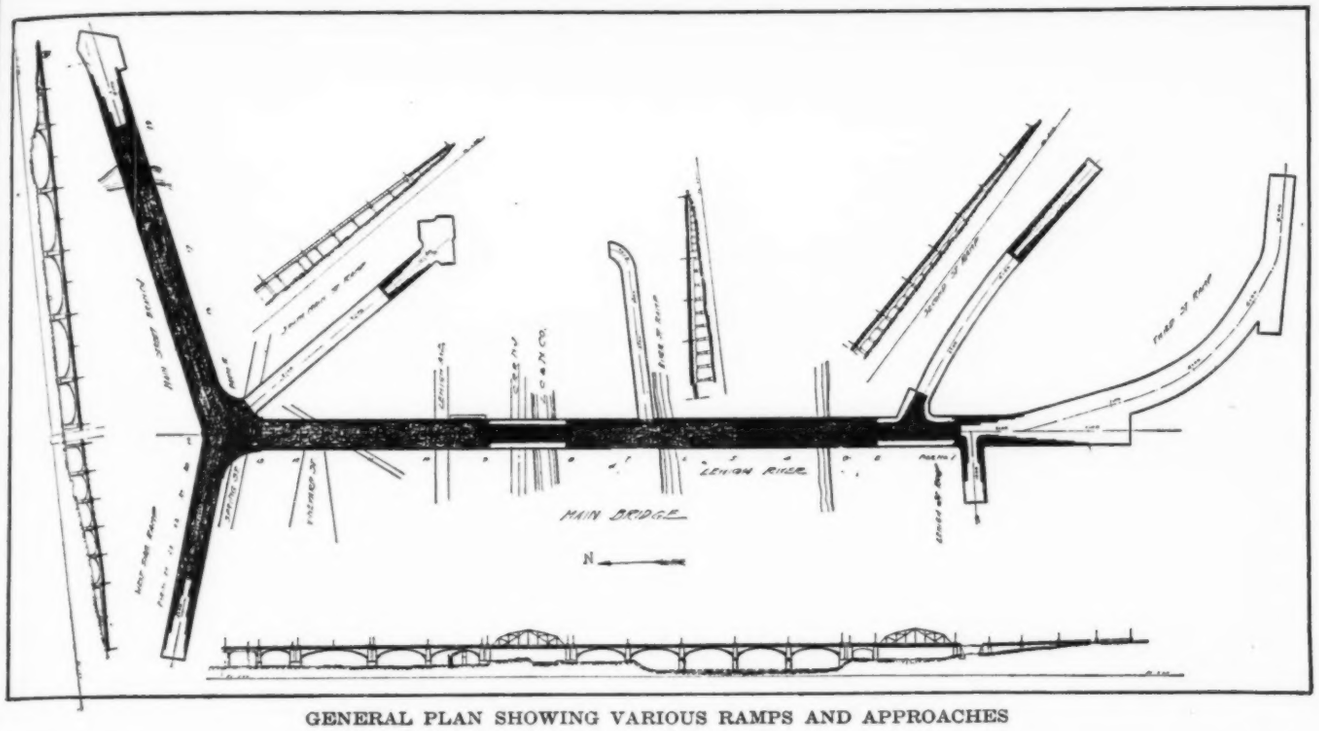
THE CHUTING TOWER

The general view at the bottom of this and the opposite page shows the chuting system which consists of 2 mixing plants. One is located at the north extreme of the main bridge, where concrete will be mixed for the north half of the structure, including the north and south main street approaches. The second mixing plant is located on River Street and will supply all concrete from the north side of the canal, south to the end of the Third Street ramp, also River Street, Second Street and Lehigh Street ramps. The total yardage of concrete is approximately 107,000 cu. yd., being about equally divided between the 2 mixing plants. Each plant has a 1-yd. mixer, sand and stone being supplied to overhead bins by a clamshell bucket.

One steel tower on River Street, 300 ft. high, and another at Spring Street, 240 ft. high, carry the chuting system. In the middle of the river, carried on cribbing, is an auxiliary steel tower 160 ft. high for supporting the long span of chutes, which is approximately 300 ft. No hoisting is done in this tower. It is merely acting as a support for the line of chutes. All of the towers are equipped with sliding boom plants for the placing of concrete within an immediate radius of 125 ft. Sand and stone from the contractor's own pits and quarries are received and transported in 5-ton motor trucks and delivered to stock piles. Cement is received in trucks from the mills about 12 miles distant.



PANORAMIC VIEW SHOWING CHUTING SYSTEM WITH ITS TWO MIXING PLANTS

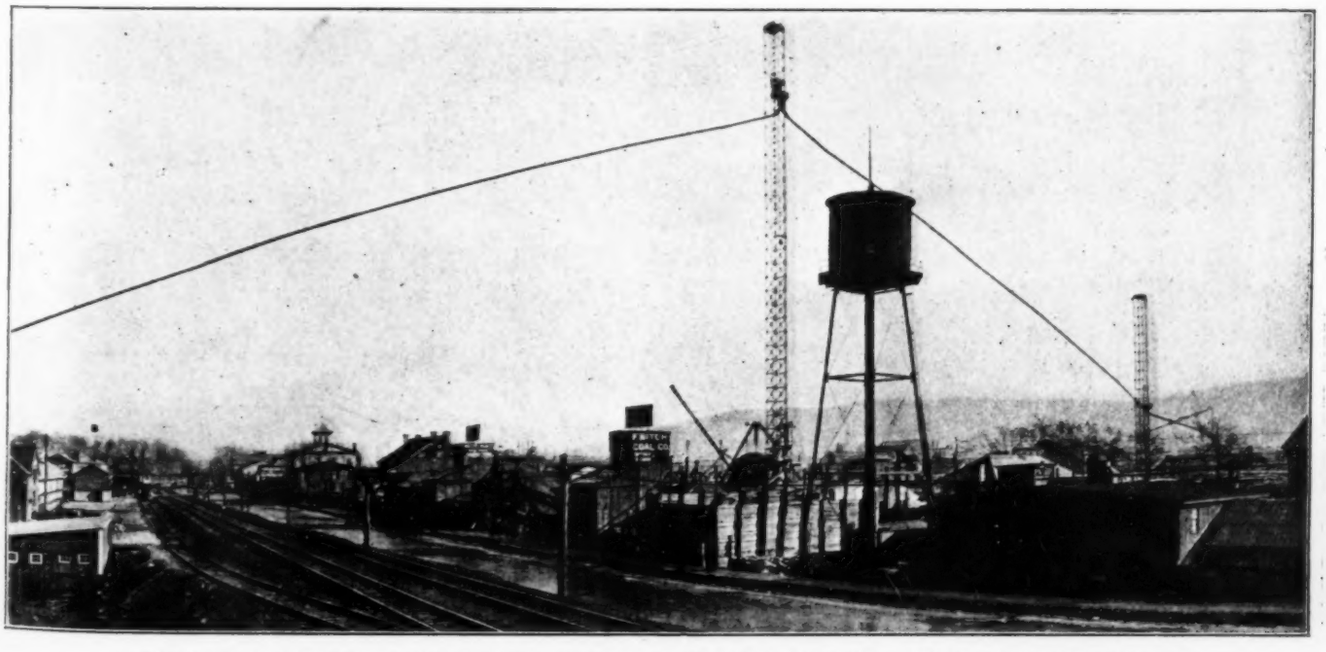


GENERAL PLAN SHOWING VARIOUS RAMPS AND APPROACHES

An oxy-acetylene flame is used to trim up the ends of steel sheet piling. Sheet piling is used in the numerous cofferdams and is driven by means of steam hammers. From previous use the ends of many of the pieces had become blunted and made unsuitable for driving. In such cases the ends were either trimmed or cut off entirely by means of the flame. This facilitated the driving considerably. The time required to trim or entirely cut off the end of the pile by this method was about 2 min.

Work was started August 1, 1921. There are 24 piers and 2 main abutments. The main bridge is 2000 ft. long and the entire structure 6000 ft. Contract time is 30 months, which will make December, 1923, the time of completion. At the present time all pier footings are completed with the exception of the 3 river piers. All piers are carried to solid rock at about a 35-ft. depth.

The Bethlehem Bridge Commission has charge of the design and construction of the structure, which is to be a combination grade crossing elimination and bridge over the Lehigh River and the Lehigh Coal and Navigation Company's canal. Clarence W. Hudson is chief engineer and H. J. Finebaum is resident engineer for the Commission. Rodgers & Hagerty, Inc., are the general contractors. George Angell is general superintendent and W. Caccia is resident engineer.



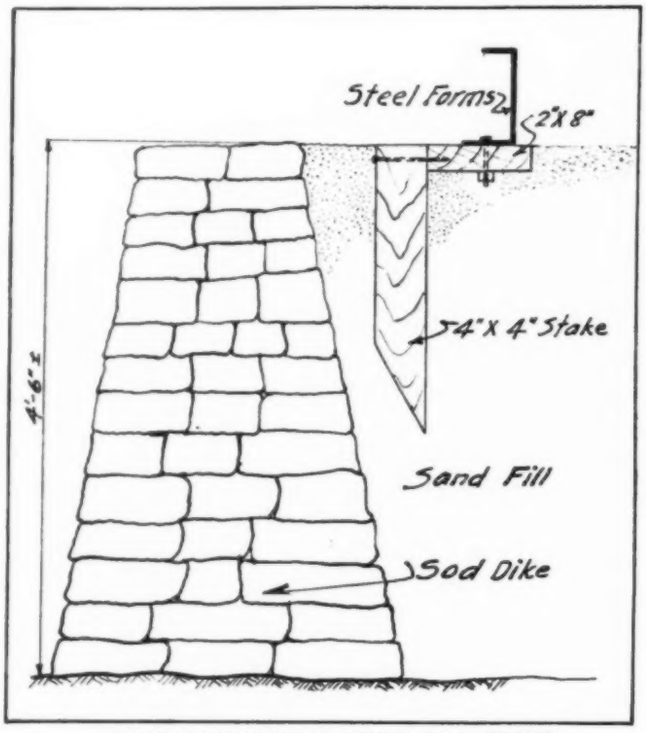
THE NEW STRUCTURE WILL CROSS OVER ALL THE TRACKS, THE CANAL AND THE RIVER

A "DIFFERENT" ROAD JOB

Causeway Across Tidal Flats Demands Novel Construction Methods

A CONCRETE road built on two miles of causeway across the meadows or swamp land on Long Island, which is under water at high tide, is being constructed by Angelo Paino, road contractor, for the City of New York, near Jamaica Bay. The highway is known as the Rockaway Turnpike, between New York Avenue and Nassau County Line, and is the first all concrete road to be built in New York City.

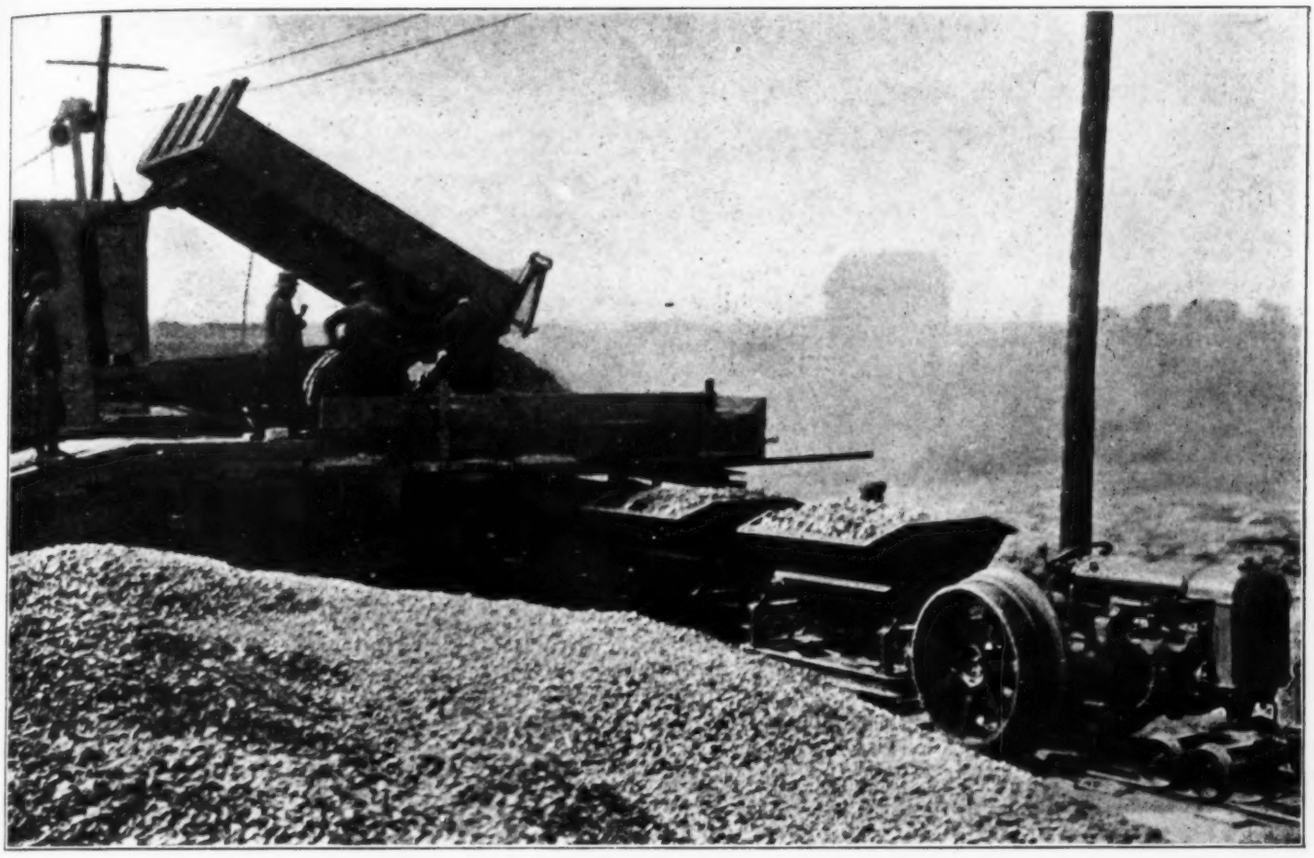
The grade of road calls for approximately a 4½-ft. fill or a total of 150,000 cu. yd. Inasmuch as the ground on either side is under water daily, the problem of how to get such an amount of fill at a reasonable cost was a difficult one to solve and is being done by unusual methods.



SOLID FOUNDATION BUILT FOR FORMS.

A 16-in. centrifugal dredge, working in Jamaica Bay, pumped sand through a 16-in. cast steel pipe, a distance of from 1500 ft. to 6500 ft. and the entire road bed was made by this means. To confine the sand pumped, levees were built of peat sod from the adjacent meadow. The levees, which will be part of the permanent embankment, serve to keep the fill off private property on one side and the trolley tracks on the other. The levees were made by piling up sod with a slight batter to the height of the finished road. The sand and water are pumped in at one end of the road, the water being allowed to flow through the two lines of dikes and escape into a creek through which it returns to Jamaica Bay. Sixty-five hundred feet of road were built in this manner and for the remainder, an 8-in. centrifugal pump

SHOWING THE SOD DIKES. SAND WILL BE PUMPED INTO THE DITCHES UNTIL LEVEL WITH THE TOP OF THE DIKES.



ALL SAND AND STONE WERE RECEIVED AT THIS POINT WHICH WAS OPPOSITE THE ONLY AVAILABLE ROAD.

was used. This pump was placed in the stream and the sand was pumped in a manner similar to that used on the first part of the job.

Four months were allowed for the material to settle, after which the work of building a 6-in. reinforced concrete slab 20 ft. wide will be begun. Outside of the sod dikes a 2 to 1 slope of earth will be placed.

When the work of constructing the slab began the contractor again faced difficulties. Access to the site was possible by only one road. The method adopted was to use motor trucks hauling sand and stone over this road to a ramp up which the trucks back and dump into a large bin with proportioning hoppers underneath. Under these hoppers six 1½-yd. industrial cars operate on 36-in. gage track (on 26-pound rails) laid on wooden ties.

The cars were hauled by a tractor equipped with flanged wheels, which supplied a paver of the ordinary type. A mechanical finisher and steel forms made up the balance of the plant operated in the usual manner. On account of the fine nature of the sand fill the placing of the steel roads forms had to be done in a different fashion. The sketch illustrates the way this was done. It was made necessary on account of the fact that the high winds cause a shifting of the sand fill to such an extent that the steel forms would be undermined and the surface of the road would be impaired. The method adopted by the contractor gave a solid bearing for the forms and proved satisfactory. The work of filling was started Nov. 1, 1921, and by the time this article appears in print the work of concreting will have been completed.

H. R. Prosser is superintendent for the contractors and devised the hydraulic method of building the road and was highly pleased with the results. It has more than come up to his expectations.

TO CONTINUE PITTSBURG HIGHWAY TESTS

THE highway tests started last year at Pittsburg, Cal., by the California Highway Commission together with the U. S. Bureau of Public Roads are to be continued to completion this spring and as soon as they are concluded an entirely new series of tests will be started on the same ground. The purpose of these tests is to investigate the strength of different types of concrete highways with particular reference to the effect of reinforcing steel.

Problems of interest to a certain locality are usually investigated by the various state highway and educational institutions throughout the country, the Bureau of Public Roads co-operating by way of furnishing part of the personnel and special instruments and equipment. At present there are in progress eight investigations of this character ranging in size from small laboratory tests requiring but one investigator and little equipment to experimental roads like the Pittsburg highway requiring a corps of research engineers and expensive apparatus.

CALCIUM CHLORIDE FOR CURING

Illinois Highway Department Tests Prove Value of Chemical in Concrete Highway Construction

By B. H. Piepmeier, Chief Engineer, Missouri State Highway Dept., and
H. F. Clemmer, Engineer of Tests, Illinois State Highway Dept.

THE value of calcium chloride in highway construction has been demonstrated to such an extent during the last year by actual practice and laboratory experiments that the Division of Highways of Illinois has not only allowed its usage to accelerate the setting of concrete in cold weather construction, but is also advocating it as a simple and practical method of curing.

Laboratory investigations were conducted on a large scale. More than 450 specimens having been made and tested for transverse strength. **In all of the experiments made the specimens treated with calcium chloride showed the best results.** Several methods of applying this chemical were tried and the greatest strength was shown by the specimens, the bare surface of which was sprinkled with the granulated chemical in the proportion of 3 lb. per sq. yd. of surface. This method of curing brought greater strength to the specimens at the end of 14 days than did the wetted earth method at the end of 28 days.

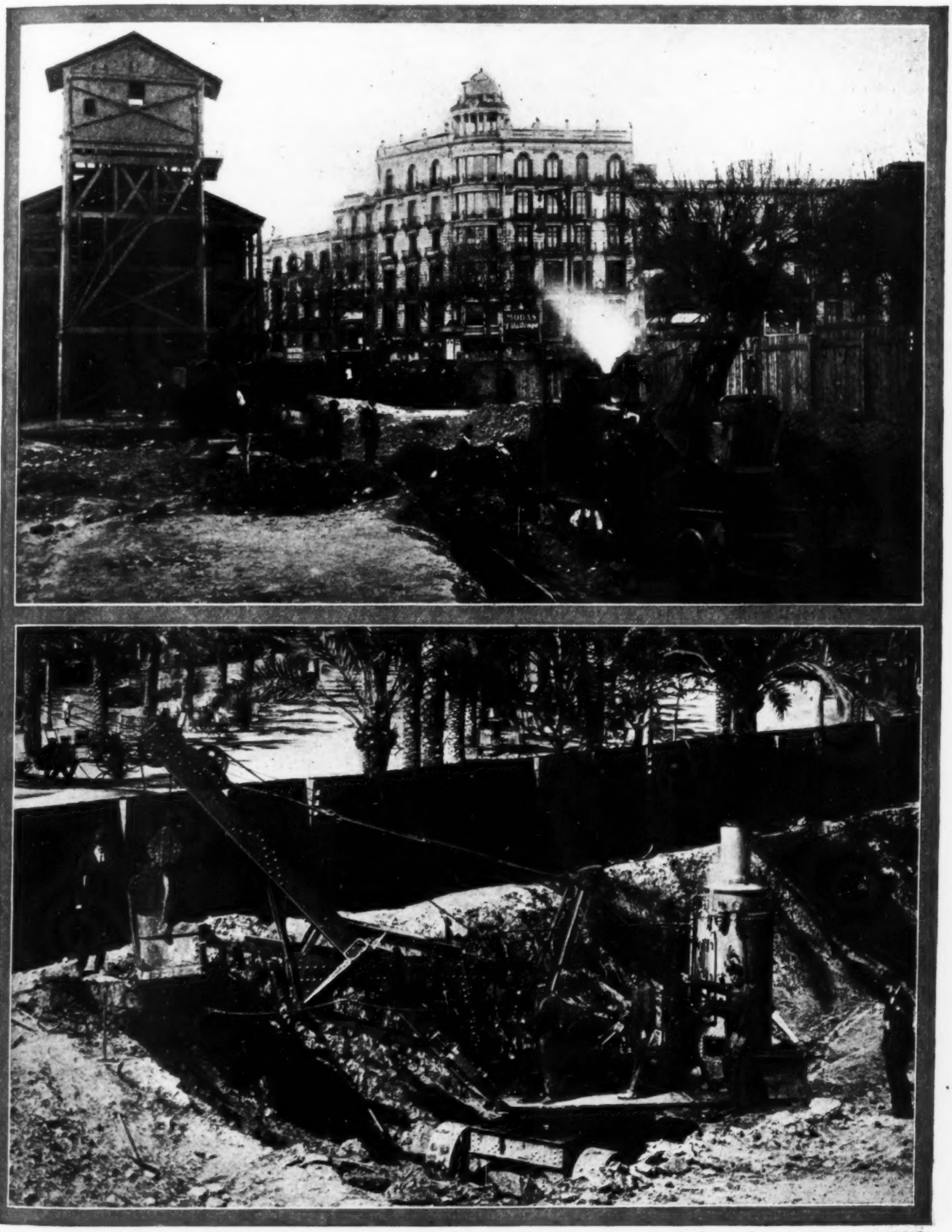
It was thought that heavy rains might wash the calcium chloride from the pavements and thus destroy its usefulness. Accordingly, tests were made with specimens from which the granular chemical was washed off 12 hr. after its application. The results of these tests seemed to prove conclusively that the beneficial effect of calcium chloride occurs chiefly within the first 24 hr. of its stay on the concrete. As in the usual course the chemicals if applied to the pavement in from 8 to 16 hr. after the concrete is finished, it would be an easy matter to protect it from rainfall for 24 hr. if the weather looked threatening, or to make the second application in case the first was washed off.

The actual curing of concrete pavements with calcium chloride was tried with favorable results in a few cases during the last construction season. In one case 7 miles of pavement were cured by first covering the pavement with about an inch of earth and then sprinkling the earth covering with a rich solution of calcium chloride, applied so as to insure approximately 4 lb. of the chemical per square yard of surface. The earth covering was felt to be necessary to hold the solution on the surface of the road and to prevent loss in case of a heavy rain.

The solution for curing was taken from water barrels placed at certain points along the road the day before pouring the slab. When the road was finished the proper amount of calcium chloride solution was applied to the earth covered surface of the pavement with an ordinary sprinkling can. Inspection was made frequently and results proved most satisfactory.

CURING CONCRETE PAVEMENTS BY SPRINKLING SOLUTION OF CALCIUM CHLORIDE ON DIRT COVERING.

Barcelona Builds A Subway



These two photographs show an American steam shovel working in the Plaza de Cataluna on one of the stations of the new Barcelona subway. The house on this shovel was practically destroyed on a previous railroad job, due to the fact that the shovel was left too close to the face of the rock when blasting was being done.

FARMERS AID IN BUILDING ROAD

Haul Rock From Nearby Fields to Crushing and Screening Plant of Indiana Contracting Company

GOOD roads passing through farming districts greatly increase the value of the land. But it is not often that the soil itself benefits by such improvement as was the case near South Bend, Indiana, where the Highways Improvement Company has a contract for 6 miles of penetration macadam road. This company by crushing, screening and storing rock obtained from adjacent fields during the winter of 1921-22 was able to get rock at a little less than it could be purchased shipped in, to keep its organization together during the winter and to assist the farmers in getting rid of rocks which otherwise might have remained in the ground and decreased its productivity.

The equipment used in the preparation and storage of this rock for use on the road consisted of a portable screening and crushing plant run by a 25-hp. steam tractor, a gasoline driven portable belt conveyor and a 5-ton scale.

When the Highways Improvement Company got the contract for this work, M. T. Calef, president and highway engineer of the company, made a survey of the farms along the road and decided that there was enough stone to be had in the adjacent fields to justify the expense of a portable crushing and screening plant. This plant was set up at central points along the road and the farmers hauled the stone to it from within a radius of 4 miles. About 60 per cent of the material was taken directly from the fields to the crusher, but sometimes the wagons all would arrive at the same time, and it was then necessary to store the material.

The crushing and screening plant reduced it to four sizes as follows: Screenings, ¼ in. to dust; fine chips, ¼ in. to ¾ in.; coarse chips, ¾ in. to 1¼ in.; No. 1 base stone, 1¼ in. to 4 in. As the rock was very hard, the large sizes predominated. In fact, the partition between the bins for the third and fourth sizes was entirely removed so that both these two sizes flowed directly to the conveyor from the screen.

The work of storing was taken care of by a gasoline driven conveyor. From January 10 to April 5, 1922, or approximately 3 months, it built up storage amounting to more than 7000 tons. As can be seen in one of the photographs, the conveyor was moved around with the spout of the bin as the center. The piles are more than 20 ft. high and could have been made higher.

VIEW OF CRUSHING AND SCREENING PLANT USED IN PREPARING THE ROCK AND OF PORTABLE CONVEYOR WHICH STORED THE MATERIAL

SHOWING PILES OF ROCK MADE BY THE CONVEYOR WHICH WAS MOVED AROUND WITH THE SPOUT OF THE BIN AS THE CENTER

The advantages of storing in this manner are numerous. In the first place, very little storage ground is required, practically all labor is eliminated and the material is in such shape that it can be reclaimed quickly when it is necessary to get it out under the road, thus insuring speedy work on the subgrade.

The stone shown in the foreground of one of the pictures gives a good idea of the various sizes and shapes, most of the stone being igneous rock consisting of basalt, granite, niggerheads, etc.

BURYING A CONCRETE SHIP

ALTHOUGH the uses of concrete are manifold, it is interesting to note the career and fate of the concrete tanker *Selma* which has recently been buried at considerable expense to get rid of it and stop wharfage charges.

The vessel, which is reported to have cost nearly $2,000,000, ran into the rock jetties at Tampico, Mexico, about a year ago, and ripped a large hole in the bottom of the hull. It was raised with compressed air and towed to Galveston. There ship builders decided it would not be practicable to repair the damage. The reinforcing rods projected through the hull and as it would have been extremely difficult to get the craft into position upon the drydock for repair, the *Selma* was allowed to sink into the mud at the wharf, where it lay nearly a year, piling up wharfage charges at the rate of $1,500 a month.

The ship was offered for sale, but no purchasers appeared. The Federal Engineering Department objected to the proposal that it be towed out and sunk, on the ground that the hulk might set in motion currents which might undermine the jetties. The proposal for taking the ship out to sea and allowing it to sink was abandoned because it was feared that it would sink before it could be towed far enough not to become a menace to navigation.

The method finally adopted to get rid of this white elephant was to dredge a channel out into the sand flats at one side of the government channel 30 ft. deep and 400 ft. long. The *Selma* was then raised by compressed air and run into this channel and allowed to settle to the bottom. Its decks and upper works are still above water and are expected to remain so for a long time. All movable machinery was salvaged, but no attempt was made to remove machines imbedded in the concrete.

GOOD PROGRESS ON SHANDAKEN TUNNEL

FROM January 1, 1921, to January 1, 1922, 47,370 lin. ft. of completed trimmed tunnel were driven by the Shandaken Tunnel Corporation, which has the contract for the construction of the Shandaken Tunnel which is part of the enterprise to supply water from the Catskills to New York City. So far as is known, this is the world's record for progress in tunnel excavation over any similar period.

The Shandaken Tunnel is the longest continuous tunnel in the world for any purpose, and when completed there will have been used in its construction more than 2,500,000 lb. of explosives.

Some idea of what this particular unit of work consists may be had when it is considered that it represents the excavation and lining of a tunnel 18 miles long, at an average depth of 600 ft. under ground, the rough size of which is approximately that of a single track railroad tunnel. When completed, it will be horseshoe in section, concrete lined, with inside dimensions of 11 ft. 6 in. in height by 10 ft. 3 in. in width, with a uniform slope of 4.4 ft. per mile, except for the northerly 3½ miles, which is depressed, making this portion a pressure tunnel.

The north heading of Shaft 3 made the maximum monthly progress for any heading on a two-shift basis during August when 593 ft. was driven in 58 shots, giving an average advance of 10.22 ft. per shot.

Engineering plans for this work involved the sinking of eight shafts, the deepest of which is 647 ft., nearly 100 ft. deeper than the Washington Monument is high. A further idea of its magnitude may be grasped when it is stated that the driving of this tunnel involves rock excavation of approximately 600,000 cu. yd., 100,000 cu. yd. of earth excavation, 200,000 cu. yd. of concrete and 445,000 barrels of cement. During the year 291,772 cu. yd. of rock excavation were made and 5845 heading shots, averaging 8.1 ft. per shot.

The work is proceeding under the direction and supervision of the Board of Water Supply of New York City. The contract for the Shandaken Tunnel was let November 10, 1917, to the Degnon Contracting Company, which carried on the work until November 10, 1920, when the Shandaken Tunnel Corporation became responsible for its completion and the Ulen Contracting Corporation took actual charge of the undertaking as the operating unit. Thomas S. Shepperd is general manager for the Ulen company.

ONE OF THE TUNNEL SHAFTS AT WHICH POINT THE TUNNEL IS 394 FT. UNDERGROUND. THE STONE CRUSHER MAY BE SEEN AT THE RIGHT

Trees for Derricks

USING two trees growing on the premises for derricks with which to hoist his materials, Stanley Biegalski is building a three-story brick house on the outskirts of Chicago. When Mr. Biegalski bought the

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property he conceived the novel idea of building around the two large trees on it, using them to raise his material to the required levels. When the house is nearly completed, he intends to cut these trees away.

Loader Makes Excavation

VOGEL & MILLER, excavating contractors, South Norwalk, Conn., are using a bucket loader to make the excavation on the construction of the Odd Fellows' new club house. The material is of a gravelly

nature and must be taken out to a depth of about 7 ft. In all there are about 3200 cu. yd. Two men with shovels feed the discs and the loader is moved about from time to time under its own power.

Steam Shovel Builds Trenches

THE photograph below shows how John J. McGarry, of Edgewater, New Jersey, builds trenches with his full circle swing small shovel. The trench is for the relaying of 30 in. water main in place

of the existing 10 in. pipe. By means of the platform he straddles his trench and is able to excavate and backfill in one operation.

Demolishing Old Buildings

THIS photograph shows a typical example of the method used in New York City in demolishing old buildings. The material is dumped into the chute

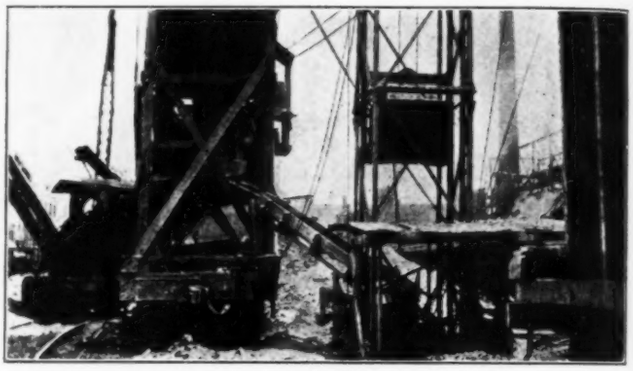
shown in the photograph, and when the truck arrives the man standing on top of the chute opens the gate, releases enough material to fill the truck and the truck moves off with only a slight loss of time.

Protecting Memorial Trees

THE above photograph was taken in front of the site of the new Roosevelt Apartment House on the Grand Concourse, New York City, said to be the largest 6-story apartment house in the world, covering 30 city lots. The photograph shows the care which the contractor exercised to protect the memorial trees which were dedicated by the American Legion, Bronx County, to the boys who lost their lives in the World War. In all there are about 1200 of these trees lining the Grand Concourse and each tree bears on a bronze plate the name of a dead soldier.

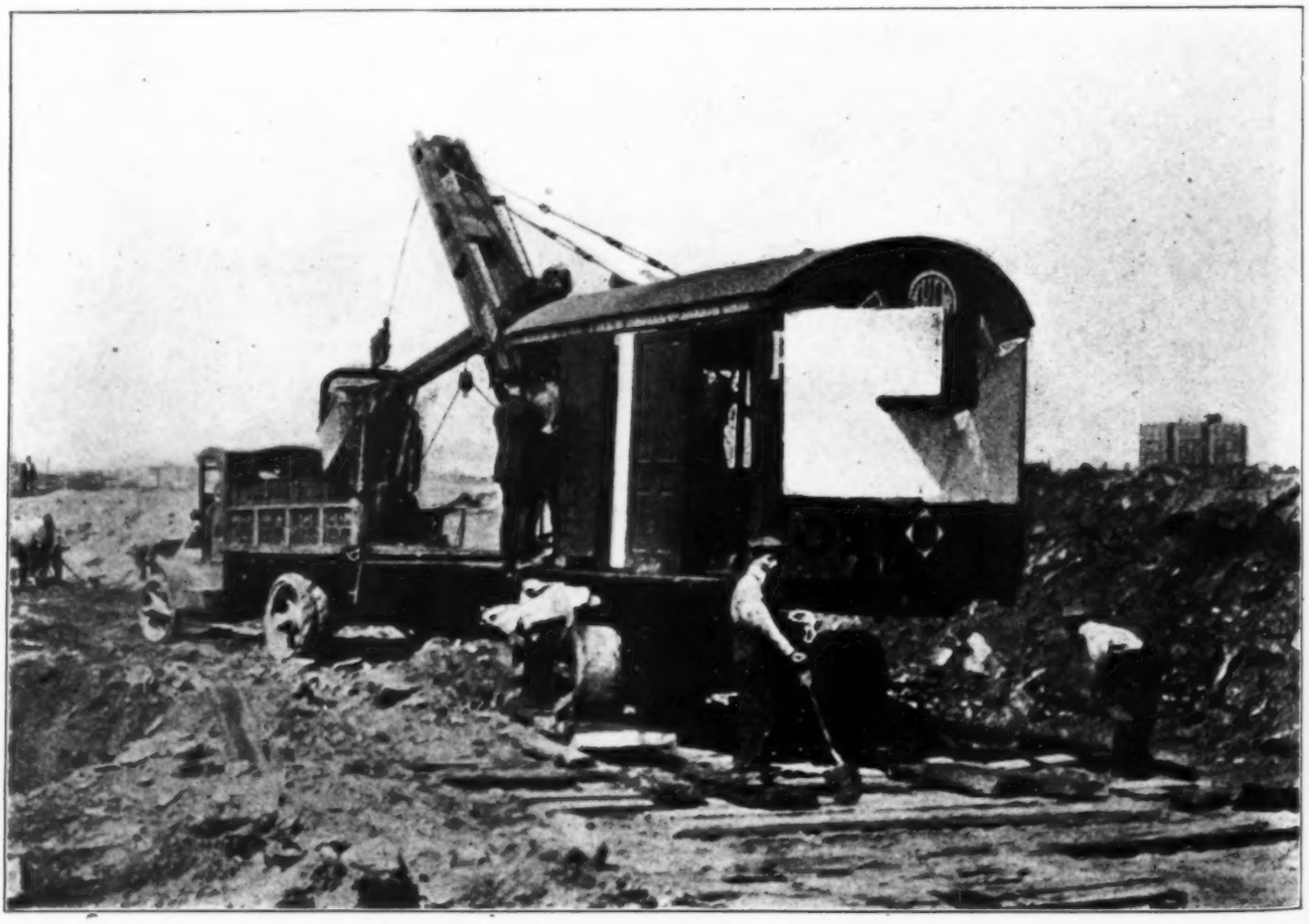
COMBINATION CONCRETING PLANT

A COMBINATION concreting plant made up of one fixed and one mobile unit, as illustrated, was used by the Koppers Company of Chicago, Ill. The mixer is mounted on railroad trucks and supplies concrete to the elevator bucket of the steel tower.



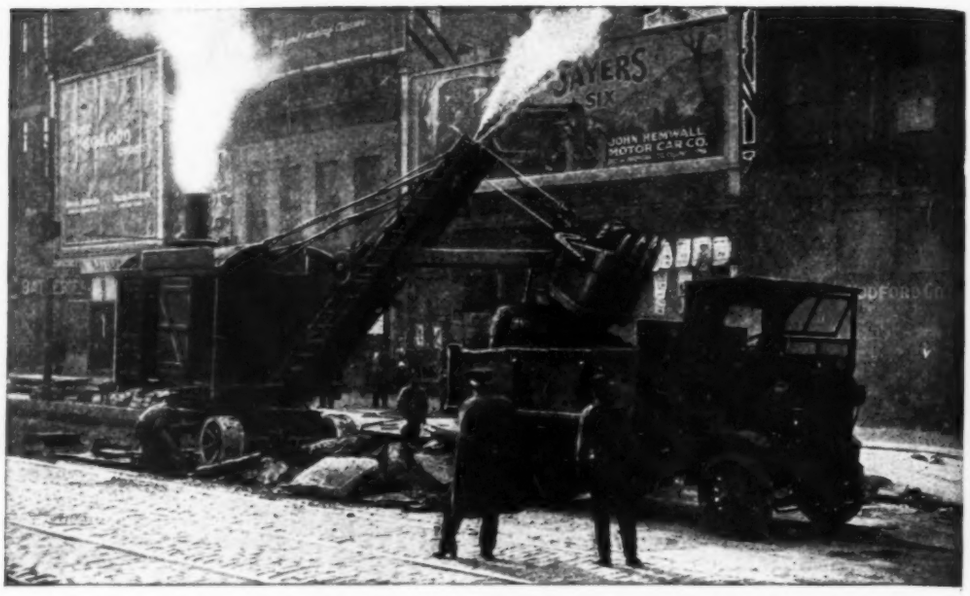
First on the Job

THE steam shovel is generally the first thing on the job when it comes to putting over a tremendous sporting project. As in the case of the enormous arena built on Boyle's Thirty Acres in New Jersey, where the Dempsey-Carpentier fight was held, the steam shovel was again first on the job when work commenced at the Yankees' new ball park in New York City. The White Construction Co. is the contractor.



Powerful

"A tough job might slow up a Thew; only an impossible job can stop one."



This Type O (¾ yd.) Thew steam shovel broke, dug up and loaded 2½ miles of 6 inch concrete pavement 11 ft. wide, at an average speed of over 400 ft. a day.

Economical

"The low cost of operation and the very small repair expense make every Thew a money saver."

In spite of poor hauling facilities this Type O gasoline Thew dug and loaded over 300 cubic yds. a day in boulder packed and frozen clay.

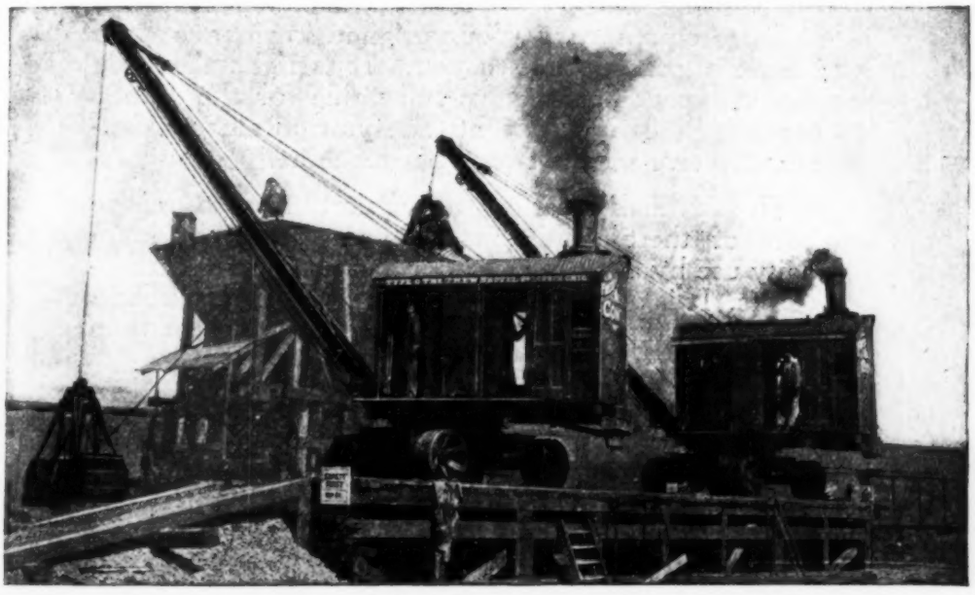
Thew Power Shovels

THE THEW SHOVEL CO., LORAIN, OHIO

On this job the two Type A-1 (1 yard) Thews did better than 1,400 cubic yards a day. The going was tough, midwinter digging in hard clay.

Fast

"Some are said to be faster, but none can turn out the daily yardage of a Thew."



Handling aggregate for a daily average of 482 ft. of road, these Type O Thew steam cranes unloaded 10 cars a day and kept 17 trucks busy.

Versatile

"And don't forget that as a crane the Thew is also a leader."

Thew
Power Shovels

THE THEW SHOVEL CO., LORAIN, OHIO

DEMONSTRATING TRUE ECONOMY

HANDLING big outdoor jobs nowadays makes necessary the adoption of the most modern methods and the careful selection of equipment that will guarantee continuous service.

In the illustration below, is shown one of the common uses for the Clyde Standard Two-drum Hoist. It is in use by Foley Bros. of St. Paul in the construction of the New Pier C for the Erie Railroad at Weehawken, N. J. This pier is 100 feet wide by 832 feet long.

Two Clyde 8¼"x10" duplicate cylinder, 40 H. P. hoists with 42"x102" A. S. M. E. boilers, 100 lbs. pressure, are in continuous service operating the mammoth pile drivers.

For many years Clyde engines have represented the last word in hoisting equipment. Each engine is completely assembled at the Clyde plant and thoroughly tested. Every hoist must more than meet its rated capacity. After shipment, when it is out on the job, it must make good or the Clyde Company will.

Clyde service begins with the receipt of your inquiry and lasts throughout the life of the equipment you buy.

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You'll find this protection in

WILLIAMSPORT WIRE ROPE

Not in one grade but all grades

Every foot of Williamsport rope made since November has a patented Telfax tape running clear through the hemp core, which plainly indicates each grade.

For years able engineers who have sensed the dangers from errors and substitution, often at the cost of human lives—have demanded the protection you now get from WILLIAMSPORT.

No concern who sells you wire rope has a right to expect you to take his word for its grade. Human life is too sacred to risk to careless mistakes, so easily made.

WILLIAMSPORT is a Quality product and for years the output of this mammoth plant has been absorbed by operators, whose requirements demanded uniformly high quality. Increased facilities now make available to all this famous rope with Telfax tape protection.

A handsome Telfax Color Chart and a booklet on Modern Wire Rope mailed on request.

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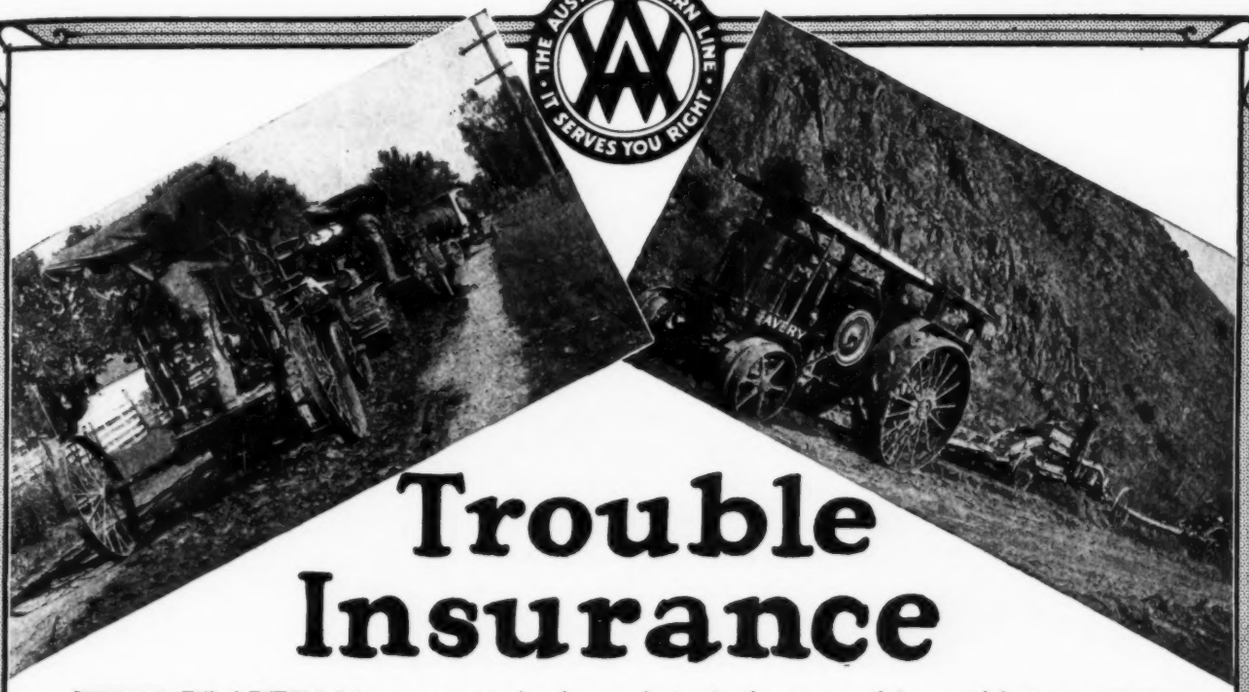

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A PROPERLY constructed sub-grade is the best possible trouble insurance for any road or pavement. Give the proper attention to the sub-grade and the wearing course has every chance to make good; slight the sub-grade, and the highest type of pavement will fail.

For your sub-grade work you will find in the complete line of A-W Graders and Grader-Scarifiers a model that is as good as made to order for your particular requirements. The graders range in weight from 1,000 to 9,000 pounds and will handle anything from shaping up an old grade to breaking a new grade through virgin country. Grader-scarifiers will break the way for the grader on especially difficult new work, or will loosen an old surface that must be regraded.

The Austin Rip-Snorter is especially good on resurfacing work as it scarifies and grades at the same time. It will loosen the old surface and bring it to the proper grade in one operation, or will carry the loosened material to the sides of the road where it can be used to form the shoulders or can be easily loaded into wagons.

Write today for a copy of ***General Catalog No. 21-X*** *in which all of these* ***Graders*** *and* ***Grader-Scarifiers*** *are illustrated and described in detail.*

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"It Serves You Right"

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Motor Rollers	Elevating Graders	Street Sprinklers
Steam Rollers	Road Scarifiers	Road Oilers
Rock Crushers	Motor Sweepers	Dump Wagons
Reversible Graders	Street Sweepers	Culverts

WESTERN

Rock Crushers	Road Planers	Drag Scrapers
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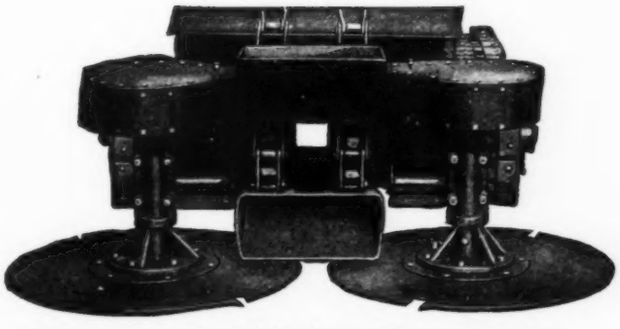
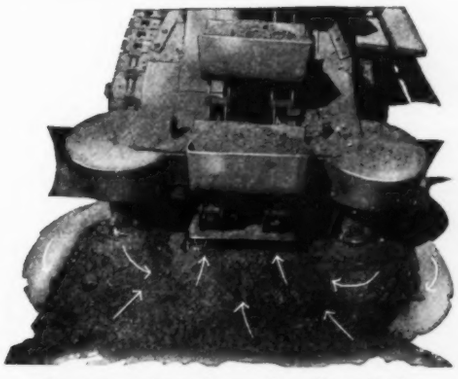
SELF-FEEDING LOADER

PROGRESS IN DESIGN

Disc Feeder 1916
Four-Cylinder Motor . 1919
Semi-Crawler 1919
Full Crawler 1920
Refinements 1922



This is the patented feeder. First self-feeder to be used on any bucket loader.



Arrows show how the discs bring material to the buckets.